Incidence of Colles' Fracture in a North American Community

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Abstract: In a 30-year period, 1,137 adult residents of Rochester, Minnesota experienced 1235 Colles' fractures. Fracture incidence among women increased over sixfold between ages 35–39 and 60–64 and then leveled off. Male rates were lower in every age group and did not rise as dramatically. Fractures associated with moderate trauma were responsible for the increased incidence with age and the excess among women. Overall, Rochester rates were 30 per cent or more greater than those reported from communities in other countries (*Am J Public Health* 1982; 72:605–607.)

Fractures associated with osteoporosis pose a substantial threat to the lives and health of elderly individuals.[1] Colles' fracture of the metaphyseal region of the distal radius is one of the most common fractures of this type, but no satisfactory incidence data have been available. The incidence of all distal forearm fractures has been described from other countries,[2–5] but there have been no adequate reports from a community in the United States even for this more general category of fractures. Reliable incidence rates for such fractures are essential if we are to quantify the potential benefits of preventing osteoporosis and accurately determine the benefit: risk ratios of prophylactic regimens which might be hazardous, such as long-term estrogen administration. The identification of a population-based cohort of Colles' fracture patients for a study of osteoporosis risk factors provided the opportunity to fulfill this requirement by describing the incidence of Colles' fracture among adult residents of Rochester, Minnesota for the 30-year period 1945–1974.

Methods

Population-based studies are possible in Rochester owing to a central index of the diagnoses made among the residents by essentially all medical care providers.[6] This system permitted us to identify all Colles' fractures which occurred among Rochester residents 35 years of age or over during the period 1945–1974, whether the diagnosis resulted from emergency room treatment, outpatient visits, hospitalization in this or surrounding communities, nursing home care, or autopsy. The original medical records were reviewed for each patient and the degree of trauma associated with the fracture ascertained. Radiography or autopsy confirmed each diagnosis of Colles' fracture. Incidence rates were determined using age- and sex-specific person-years estimated from census data and considering the entire population of Rochester 35 years old or over to be at risk.

Results

In the 30-year period 1945–1974, 1,137 Rochester residents 35 years old or over suffered 1,235 Colles' fractures. Over 90 per cent (1,118) of these were initial fractures and 117 were recurrent. Women were represented nearly six times as often as men, and all but four of the patients were White, reflecting in part the racial composition of the community. As shown in Table 1, the incidence of all and of initial Colles' fractures among women increased steadily until age 60–64 and then appeared to level off. Among men, the incidence rates increased during early middle age but stopped rising ten years sooner, around age 50–54. No cases were observed during the study period among men 85 or more years old, but the true rate for this group is unlikely to be zero. The crude total incidence rate for women was significantly greater ($p < 0.001$) than that for men, although the female:male incidence ratio was reduced slightly to 4.6:1

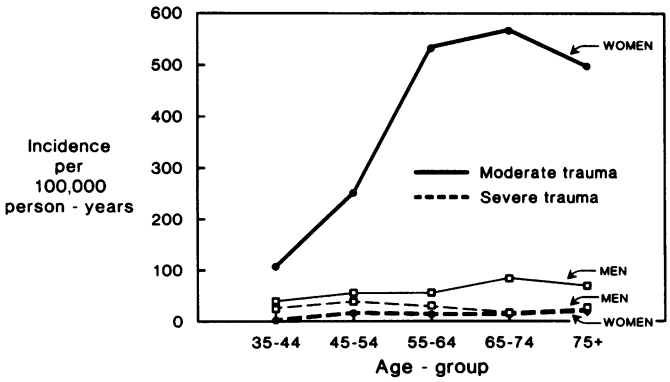

FIGURE 1—Age- and Sex-Specific Incidence of Colles' Fracture Associated with Moderate or Severe Trauma among Rochester, Minnesota Residents 1945–74

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TABLE 1—Incidence of All Colles' Fractures and of Initial Colles' Fractures among the Adult Residents of Rochester, Minnesota 1945–74

	All Colles' Fractures				Initial Colles' Fractures			
	Men		Women		Men		Women	
Age-Group (years)	N	Rate*	N	Rate	N	Rate	N	Rate
35–39	16	46.7	40	109.3	15	43.8	39	106.6
40–44	22	70.1	43	122.5	22	70.1	41	116.8
45–49	21	78.8	71	212.2	21	78.8	65	194.5
50–54	33	130.2	120	384.3	30	118.4	112	355.4
55–59	22	97.6	159	539.3	21	92.9	146	494.9
60–64	15	79.6	178	702.6	14	74.3	162	639.8
65–69	16	120.4	140	632.5	15	113.3	119	537.6
70–74	11	98.9	139	776.8	11	98.9	120	669.8
75–79	8		79	601.6	8		68	517.8
80–84	5	78.3	48	574.8	5	78.3	44	526.9
85+	0		49	843.0	0		40	688.2
TOTAL	169	85.4	1066	410.4	162	81.8	956	368.0

*Incidence per 100,000 person-years

after the rates were age-adjusted. There were no definite trends in incidence during the study period; rates were about as high for both sexes in 1945–1949 as in 1970–1974.

Only 87 (8 per cent) of the initial Colles' fractures were due to severe trauma, generally motor vehicle accidents. Most of the remaining fractures accompanied moderate trauma, typically a fall from standing height or less. The incidence of severe trauma fractures, although based on relatively small numbers, did not increase appreciably with age and did not differ greatly between men and women in most age groups. On the other hand, the moderate trauma fracture incidence rose two-and-one-half times among men and increased more than fivefold among women between ages 35–44 and 65–74 (Figure 1). The female:male sex ratio for moderate trauma fractures rose from 3:1 among the 35–44 year olds to about 7:1 for the three oldest age groups. The excess incidence of Colles' fracture among women as compared to men and the rising incidence rates with age were primarily due to those fractures associated with moderate trauma, e.g. the fractures generally attributed to osteoporosis.

Discussion

The pattern of age- and sex-specific Colles' fracture incidence among adults was similar to that reported in other Western populations, but the magnitude of the rates was greater in Rochester (Table 2). The overall age-adjusted Rochester incidence was about 30 per cent greater than the figures reported from well-known early studies in Malmo, Sweden[2] and Oxford, England and Dundee, Scotland,[3] despite the fact that the latter investigations included all types of distal forearm fractures. This result was anticipated because it was already known that Rochester incidence rates for all limb fractures together during a recent three-year period were greater than those previously reported.[7] More extensive studies of hip fracture[8,9] and pelvic fracture[10] have confirmed that Rochester rates for these sites are greater than those from other countries. These differences in incidence have been attributed to more complete case ascertainment in Rochester.[7]

We are unaware of any other extensive population-based incidence data for Colles' or distal forearm fractures

TABLE 2—Age-Adjusted Incidence of All Colles' Fractures in Rochester, Minnesota Compared to Adjusted Incidence of All Distal Forearm Fractures in Other Communities, among People 35 Years of Age and Older

		Women		Men		Both	
Locale	Time Period	N	Rate*	N	Rate	N	Rate
United States, Rochester	1945–74	1066	409.4	169	88.2	1235	264.6
Sweden, Malmo[2]	1953–57	895	332.1	122	49.5	1017	204.6
United Kingdom, Oxford-Dundee[3]	1954–58	1138	304.4	209	72.9	1347	200.7
Yugoslavia[4]	1968–73						
High calcium district		598	221.3	207	98.1	805	164.3
Low calcium district		498	196.9	251	112.2	749	158.7
Singapore[5]	1962–63	162	58.3	196	61.6	358	59.8

*Incidence per 100,000 person-years directly age-adjusted to the population structure of 1970 United States Whites 35 years old and over.

from the United States. The incidence of wrist fractures was studied in two New York State communities for a one-year period,[11] but only the 1966 Colles' fracture patients who were also residents in 1945 were included and the rates were based on less than 30 cases in each instance. In the absence of comparable data from other communities, it is difficult to demonstrate that Rochester incidence rates reflect the situation nationally. However, a similar question existed about the relatively high hip fracture incidence in Rochester. In the case of hip fracture, it was possible to show that the crude Rochester incidence rate was almost identical to the crude hospital discharge rate for hip fractures in the North Central region of the United States.[8] A similar validation is not feasible for Colles' fractures since most are managed on an outpatient basis.

The Rochester rates appear to be the best currently available for estimating Colles' fracture incidence in the United States. Use of the lower Swedish rates, as was done by Weinstein,[1] for example, could have underestimated Colles' fractures in the White population of the United States in 1970 by nearly 50,000 cases. This obviously leads to underestimation of the costs of osteoporosis, especially when combined with the use of inappropriately low rates for other fractures as well, and distorts the benefit-risk ratio of osteoporosis prevention efforts.

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A one-week summer program entitled "Controlled Release Technology: Polymeric Delivery Systems for Drugs, Pesticides, and Foods" will be offered Monday, July 19 through Friday, July 23, 1982 at the Massachusetts Institute of Technology. Of interest to chemists, chemical engineers, pharmaceutical scientists, physicians, and technical managers with an interest in controlled release technology, the program will explore recent advances in controlled release technology and cover polymer systems as they relate to achieving appropriate design of controlled release and liposomal formulations.

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